RESEARCH ARTICLE

PREVALENCE OF HYPOTHYROIDISM AMONG PATIENTS OF MEERUT, UTTAR PRADESH: A HOSPITAL BASED STUDY

Naved Ahmad[1], Meenakshi Panthari[1], Akash Gupta[2], Prasnna Chandra[2], Sana Nafees[3]
[1] Department of Biochemistry, Subharti Medical College, Meerut, UP, India
[2] Department of Biochemistry, Sarswathi Institute of Medical College, Hapur, UP, India
[3] Department of Medical Toxicology, Faculty of Science, Jamia Hamdard, New Delhi, India

Correspondence to: Akash Gupta (akash_inspace@yahoo.com)

DOI: 10.5455/ijmsph.2013.080320132 **Received Date: 16.01.2013** **Accepted Date: 08.03.2013**

ABSTRACT

Background: Hypothyroidism is a widespread thyroid problem, but there are no reports on the incidence and prevalence of hypothyroidism in this part of our country, that is western UP.

Aims & Objective: The aim of the present study was to assess the prevalence of hypothyroidism in Meerut and nearby areas.

Material and Methods: This retrospective hospital based study involved 4739 patients having undergone thyroid function assay, in the central clinical biochemistry laboratory of Subharti Medical College and its associated hospital. These patients were evaluated for thyroid hormonal assay-tri iodo thyronine (T3), tetra iodo thyronine (T4) and thyroid stimulating hormone (TSH) by Mini Vidas auto analyzer using enzyme linked fluorescent assay technique. Statistical analysis was performed by SPSS version 17 software.

Results: Our study shows high prevalence of abnormal thyroid hormone levels (hypothyroidism was 8.2% & subclinical hypothyroidism was 8.4%) with female preponderance.

Conclusion: The study has defined thyroid function status in thyroid patients of Meerut, Uttar Pradesh (U.P). Higher prevalence of hypothyroidism was observed in patients (especially females) in their second & third decade of life. The findings also supports the usefulness of screening of thyroid function compulsory after age of 30 years, for early detection and treatment to reduce the ill effects of thyroid dysfunctions.

KEY-WORDS: Hypothyroidism; T_3; T_4; TSH

Introduction

Hypothyroidism is one of the most common forms of thyroid dysfunction.[1] It may be congenital or acquired, primary or secondary, chronic or transient.[2] It refers to a state that results in a deficiency of thyroid hormones, including hypothalamic or pituitary disease and generalized tissue resistant to thyroid hormone, and disorders that affects the thyroid gland directly.[3] Biochemically decrease in T_3 & T_4 concentrations lead to hyper secretion of pituitary TSH and an amplified increase in serum TSH levels. This is a key laboratory findings, particularly in the early detection of thyroid failure.[4] The most common cause of hypothyroidism is primary failure of the thyroid gland. It covers a wide spectrum of clinical & biochemical disease, from clinically unapparent disease to myxoedema and coma.[5] Various types of medication, including amiodarone, cytokines and lithium, also often induce hypothyroidism.[6] Clinically hypothyroidism may present with variety of symptoms and signs involving major systems of the body like endocrine, cardiovascular, central nervous system, musculo skeletal, haematological, reproductive, gastro-intestinal and dermatological.[7] The signs and symptoms of hypothyroidism are nonspecific and may be confused with those of other clinical conditions, especially in postpartum women and the elderly. Patients with severe hypothyroidism generally present with a group of signs and symptoms that may include lethargy, weight gain, hair loss, dry skin, forgetfulness, constipation and depression. Not all of these signs and symptoms occur in every patient, and many may be blunted in patients with mild hypothyroidism.[8] Hypothyroidism is ten times more common in women than men and its prevalence increases with age. The prevalence of thyroid dysfunction, by definition, is testing patients in various geographic regions, primary care clinics and in population that have not been screened previously.[9,10] Around 42 million Indians are

suffering from thyroid disorders[11] and about 200 million people are at risk of Iodine deficiency disorders in India.[12] Thyroid function test panel is commonly used for screening and evaluating thyroid dysfunctions. The American Thyroid Association recommends that adults must be screened for thyroid dysfunction by measurement of the serum thyrotropin concentration at the age 35 years and every 5 years thereafter.[13]

Materials and Methods

This study was conducted in the Department of Biochemistry in collaboration with Medicine Department in Subharti Medical College, Meerut and its associated hospital. The present study was started after obtaining ethical clearance from the institutional ethical committee. Informed consent was obtained from the individual patients. Total of 4739 patients having significant history of thyroid disorder along with altered thyroid profile (T_3, T_4 & TSH) were selected. Patients with incomplete thyroid function test, non-significant thyroid history and hyperthyroid patients were excluded from the study.

After overnight fasting three ml of venous blood samples were collected in morning in plain vials under aseptic conditions. Blood was allowed to clot and centrifuged at 3000 rpm for 15 minutes at room temperature. The supernatant serum was assayed for T_3, T_4 & TSH by enzyme linked fluorescent assay (ELFA) technique using Mini Vidas auto analyzer. The reference intervals for T_3, T_4 and TSH for our laboratory were as follows[14]: T_3 – 1.23 – 3.23 nmol/L; T_4 – 59 – 135 nmol/L; TSH – 0.4 – 4.2 mIU/L. Those having normal T_3, T_4 TSH levels were categorized as euthyroid, those having low T_3, T4 and high TSH were hypothyroid and those having normal levels of T_3, T_4 and increased TSH with absence of clinical symptoms were categorized as subclinical hypothyroidism respectively.

Statistical analysis was performed with Software Package for Social Sciences version 17 (SPSS 17). ANOVA was applied to analyze the significance between the means of two groups. Data were present as mean ± standard deviation. Inter-group differences were tested by independent sample test (two groups). P values less than 0.05 were considered statistically significant.

Results

We study 4739 patients for thyroid hormone abnormalities. Out of these 3781 were females and 958 were males. The ratio of female to male is around 3.9:1 in our study. The patients were classified according to thyroid status as Hypothyroidism, Subclinical hypothyroidism and Euthyroidism (Table 1) taking reference of thyroid function test. The distribution of these patients in various age groups has been shown in (Table 2). High prevalence of hypothyroidism was observed in patients who are in their third or fourth decades of life, with a female preponderance. Within different age groups, higher prevalence of hypothyroidism and subclinical hypothyroidism was observed in patients who are within the age group of 16- 30 years.

Table-1: Sex wise Distributions of the Hypothyroid Patients (n = 4739)

	Euthyroid	Hypothyroid	Subclinical Hypothyroidism
Male	860 (21.7%)	44 (11.2%)	54 (13.07%)
Female	3090 (78.2%)	347 (88.7%)	344 (86.4%)
Total	3950 (83.3%)	391 (8.2%)	398 (8.4%)

Table-2: Spectrum of Thyroid Diseases in Different Age Groups of Males & Females

Hormonal Disorders	Age Groups (Years)					Total
	0-15	16-30	31-45	46-60	> 60	
Euthyroid	429 (10.8%)	1258 (32.5%)	1139 (28.8%)	875 (22.1%)	222 (5.6%)	3950 (83.3%)
Hypothyroid	30 (7.6%)	147 (37.5%)	105 (26.8%)	70 (17.9%)	40 (10.2%)	391 (8.2%)
Subclinical Hypothyroid	26 (6.5%)	140 (35.1%)	113 (28.3%)	58 (14.5%)	61 (15.3%)	398 (8.4%)
Total	485 (10.2%)	1572 (33.1%)	1357 (28.6%)	1003 (21.1%)	323 (6.8%)	4739

Table-3: Circulating T_3, T_4 & TSH Level (Mean ± SD) in Males & Females

Gender	Hormonal Level		
	T_3 (nmol/L)	T_4 (nmol/L)	TSH (µIU/L)
Male	1.0 ± 0.6	90.3 ± 40.8	2.6 ± 2.3
Female	1.0 ± 0.4	88.0 ± 29.8	3.0 ± 2.6

This study revealed that females are more vulnerable to hypothyroidism and subclinical hypothyroidism in our study area. Prevalence of hypothyroidism in the age group of 0-15 years was 7.6%, 16-30 years was 37.5%, in 31- 45 years was 26.8%, in 46- 60 years was 17.9% and for more than 60 years was 10.2% & prevalence of subclinical hypothyroidism in different age groups are as follows between 0-15 years 6.5%, in 16-30

years was 35.1%, in 31-45 years was 28.3 %, in 46-60 years was 14.5% & for more than 60 years was 15.3% (Table 2). Circulating T_3, T_4 and TSH level of the males & females are shown in Table 3.

Discussion

In our study the prevalence of hypothyroidism was found to be high in the patients. Although all age group presented with a high prevalence of hypothyroidism & subclinical hypothyroidism, higher number of subjects was observed between age groups of 16-30 years of age. Our study revealed that females are more vulnerable to hypothyroidism & subclinical hypothyroidism. The prevalence and pattern of hypothyroidism depend on ethnic, geographic and environmental factors including iodine status.[15] TSH plays critical role in diagnosing TSH of thyroid disorders.[16] Hypothyroidism was common in Iranian population, as 12.8 % of woman and 4.7% of man had hypothyroidism. However most of them were mildly hypothyroid.[17] In a clinic-based study from Mumbai, out of 800 children with thyroid disease, 79% had hypothyroidism, Common cause of hypothyroidism in these children were thyroid dysgenesis, dyshormogenesis, and thyroiditis.[18]

In another population-based study done in Cochin using cluster sampling strategy on 971 adult subjects, the overall prevalence of hypothyroidism was found to be 3.9%. Prevalence of subclinical hypothyroidism was also high in this study, the value being 9.4%. In this study, Urinary iodine status was also studied in 954 subjects from the same population sampled, and the median value was 211µg/l; this suggested that this population was iodine sufficient.[19] The link between endemic goiter and iodine deficiency has been researched in India by several eminent researchers, and this led to the publication of several important reports.[20-22] Critical research has resulted in endemic goiter being reported from all over the country and not just from the Himalayan and Sub- Himalayan regions.[23] Researchers from New Delhi had shown that the hypothyroidism was linked to iodine deficiency and this resulted in decompensated hypothyroidism in many cases.[23] A study reported that hypothyroidism was more prevalent (40.5 %) in the age group of 36-45 years with obvious female preponderance.[24] Another study quoted age preponderance of 34-years and above.[25] A study in Makkah exhibited similar age group predominance of 40 ± 12 years on the prevalence of thyroid disorders.[26] A study from five coastal areas of Japan[27], which has iodine rich seaweed (kelp), showed that the prevalence of hypothyroidism was 0 - 9.7%. Another study from northern Japan, where iodine intake is high, revealed that 0.7% of men and 3.1% of women were overt hypothyroid.[28] NHANES III found the prevalence of subclinical hypothyroidism with a TSH>4.5m IU/L in the U.S. Adult population to be 4.3%, six times more prevalent than subclinical hyperthyroidism.[29] One of the studies showed that, overt hypothyroidism was present in 33% and subclinical hypothyroidism in11% patients in obese patients.[30]

Conclusion

This is the first study conducted on hypothyroidism, in this part of India, with respect to thyroid disorders (hypothyroidism). This study demonstrates that hypothyroidism, mainly subclinical hypothyroidism, was alarmingly high in this region with female vulnerability. The prevalence of hypothyroidism was more significant in the age group of 16-30 years. This indicates that thyroid disease should be considered during routine evaluation of this susceptible group and should be followed by appropriate detection and treatment. The findings that a large number of women unknowingly have laboratory evidence of thyroid dysfunction supports the usefulness of screening of thyroid function compulsory after age of 30 years, for early detection and treatment to reduce the ill effects of thyroid dysfunctions. Further research may determine whether the treatment of hypothyroidism & subclinical hypothyroidism will benefit in preventing adverse health outcomes such as Decrease in BMD (Bone Mineral Density), cardiovascular diseases and hyperlipidemia. We hope to extend our study to a large cross section of men and women in this region keeping in mind individual's occupation, body habitus, stress levels, geographic, environmental and etiological factors like auto immunity, drugs & iodine status.

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Cite this article as: Ahmad N, Panthari M, Gupta A, Chandra P, Nafees S. Prevalence of hypothyroidism among patients of Meerut, Uttar Pradesh: A hospital based study. Int J Med Sci Public Health 2013; 2:539-542.
Source of Support: Nil
Conflict of interest: None declared